

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
2 October 2003 (02.10.2003)

PCT

(10) International Publication Number  
**WO 03/081224 A1**

(51) International Patent Classification<sup>7</sup>: **G01N 27/62**,  
G01P 5/08

(21) International Application Number: **PCT/FI03/00226**

(22) International Filing Date: 25 March 2003 (25.03.2003)

(25) Filing Language: Finnish

(26) Publication Language: English

(30) Priority Data:  
20020565 25 March 2002 (25.03.2002) FI

(71) Applicant (for all designated States except US):  
**LAPPEENRANNAN TEKNILLINEN KORKEAK-  
OULU [FI/FI]**; P.O. Box 20, FIN-53851 Lappeenranta  
(FI).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ANTTALAINEN,  
Osmo [FI/FI]**; Visatie 7, FIN-50120 Mikkeli (FI).

(74) Agent: **BERGGREN OY AB**; P.O. Box 16, FIN-00101  
Helsinki (FI).

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD,  
SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US,  
UZ, VC, VN, YU, ZA, ZM, ZW.

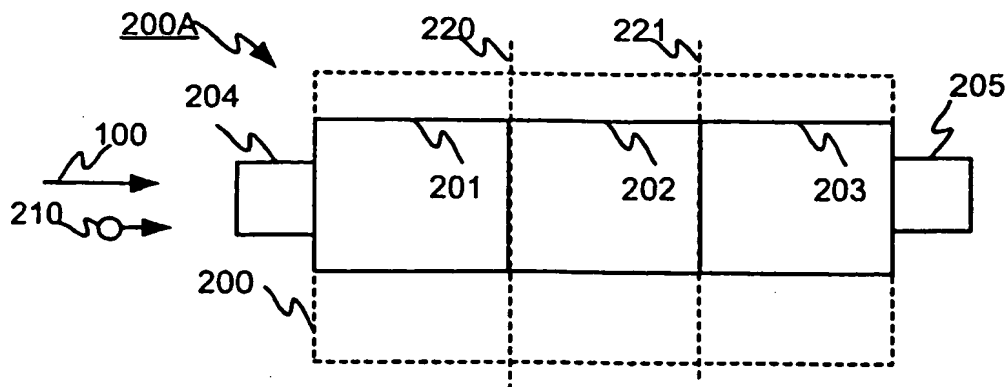
(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,  
SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM,  
GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

- with international search report
- before the expiration of the time limit for amending the  
claims and to be republished in the event of receipt of  
amendments

For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: A CELL STRUCTURE, DEVICE AND METHODS FOR GAS ANALYSIS



(57) Abstract: The invention relates to a gas analysis based on the mobility of ions. The invention relates to a cell structure of an analysis device, the cell structure comprising the reference cell (201), the ionisation section (202) and the analysis cell (203) for identifying the electric mobility of ions. The invention also relates to a method for identifying the ions. Further, the invention relates to a system for identifying the ions.



WO 03/081224 A1

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/JP03/00226

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

**see extra sheet**

1. ☒ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

### Remark on Protest

- ☒ The additional search fees were accompanied by the applicant's protest.  
☐ No protest accompanied the payment of additional search fees.

**Box II**

**Invention 1:**

The invention according to claims 1-26 relates to a cell structure, device, system and method for identifying of matter contents in gases based on ions electrical mobility, where the gas is transported through the flow channel including a reference cell, an ionization cell and an analysing cell and two electrical fields are applied.

**Invention 2:**

The invention according to claims 27-28 relates to a method for determining flow speed of a gas based on changes of charges of three pairs of electrodes during applying of three electrical fields.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 03/00226

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: G01N 27/62, G01P 5/08

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: G01N, G01P, G01F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI, PAJ, INSPEC

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5475217 A (ROBERT F.D. BRADSHAW), 12 December 1995 (12.12.95), column 3, line 51 - line 57, claims 8,9,10, abstract  --	1-26
A	WO 9416320 A1 (ENVIRONICS OY), 21 July 1994 (21.07.94), claim 1, abstract  --	1-26
A	WO 8707720 A1 (FPUUMALAINEN PERTTI), 17 December 1987 (17.12.87), claim 1, abstract  --	1-26

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

\* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier application or patent but published on or after the international filing date
- "I" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "I" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

Date of mailing of the international search report

4 Sept 2003

05 -09- 2003

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer

Gordana Ninkovic/ itw  
Telephone No. +46 8 782 25 00

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 0169217 A2 (NATIONAL RESEARCH COUNCIL CANADA), 20 Sept 2001 (20.09.01), page 10, line 6 - line 23 --	1-26
A	WO 9207255 A1 (PUUMALAINEN CONSULTS OY), 30 April 1992 (30.04.92), claim 1, abstract --	1-26
A	US 5455417 A (EMILIO SACRISTAN), 3 October 1995 (03.10.95), abstract --	1-26
A	US 4393719 A (W.WIEGAND ET AL), 19 July 1983 (19.07.83), column 1, line 49 - line 61, claim 1 --	27-28
A	US 5701009 A (R.GRIFFITHS ET AL), 23 December 1997 (23.12.97), column 2, line 19 - line 45, claim 1 --	27-28
A	US 4193296 A (K.JANKA), 18 March 1980 (18.03.80), figure 1, claim 1 --	27-28
A	US 3688106 A (T.BRAIN), 29 August 1972 (29.08.72), column 1, line 15 - line 40, claim 1 -- -----	27-28

## INTERNATIONAL SEARCH REPORT

Information on patent family members

26/07/03

International application No.

PCT/FI 03/00226

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	5475217	A	12/12/95	CA	2116547 A,C	01/04/93
				DE	69223154 D,T	14/05/98
				DK	604528 T	27/07/98
				EP	0604528 A,B	06/07/94
				SE	0604528 T3	
				GB	9120192 D	00/00/00
				JP	6511104 T	08/12/94
				WO	9306476 A	01/04/93
				AU	3365193 A	01/09/93
				GB	2263754 A	04/08/93
				GB	9201733 D	00/00/00
				WO	9315344 A	05/08/93
WO	9416320	A1	21/07/94	CA	2153657 A	21/07/94
				EP	0679255 A	02/11/95
				FI	712 U	11/05/93
				FI	96903 B,C	31/05/96
				FI	930122 A,V	13/07/94
WO	8707720	A1	17/12/87	AT	93969 T	15/09/93
				AU	605770 B	24/01/91
				AU	7517787 A	11/01/88
				BR	8707715 A	15/08/89
				CA	1304836 A,C	07/07/92
				DE	3787281 D,T	05/01/94
				EP	0308420 A,B	29/03/89
				SE	0308420 T3	
				FI	75055 B,C	31/12/87
				FI	862349 D	00/00/00
				HK	1008092 A	00/00/00
				RU	2011981 C	30/04/94
				US	5047723 A	10/09/91

## INTERNATIONAL SEARCH REPORT

Information on patent family members

26/07/03

International application No.

PCT/FI 03/00226

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
WO	0169217	A2	20/09/01	AU	3907201 A	24/09/01
				AU	3907301 A	24/09/01
				AU	3907401 A	24/09/01
				AU	3907501 A	24/09/01
				AU	3907601 A	24/09/01
				AU	4213701 A	24/09/01
				AU	4213801 A	24/09/01
				AU	4213901 A	24/09/01
				CA	2401722 A	20/09/01
				CA	2401735 A	20/09/01
				CA	2401772 A	20/09/01
				CA	2401802 A	20/09/01
				CA	2402628 A	20/09/01
				CA	2402793 A	20/09/01
				CA	2402798 A	20/09/01
				CA	2402812 A	20/09/01
				EP	1266209 A	18/12/02
				EP	1266393 A	18/12/02
				EP	1266394 A	18/12/02
				EP	1266395 A	18/12/02
				EP	1273029 A	08/01/03
				US	2003020012 A	30/01/03
				US	2003038235 A	27/02/03
				US	2003057367 A	27/03/03
				US	2003057369 A	27/03/03
				WO	0169216 A	20/09/01
				WO	0169218 A	20/09/01
				WO	0169219 A	20/09/01
				WO	0169220 A	20/09/01
				WO	0169221 A	20/09/01
				WO	0169646 A	20/09/01
				WO	0169647 A	20/09/01
WO	9207255	A1	30/04/92	AT	154978 T	15/07/97
				AU	8643791 A	20/05/92
				CA	2093657 A	12/04/92
				DE	69126711 D	00/00/00
				EP	0552206 A,B	28/07/93
				FI	87954 B,C	30/11/92
				FI	904997 A	12/04/92
				JP	6507472 T	25/08/94
				US	5543331 A	06/08/96
US	5455417	A	03/10/95	AU	2435995 A	29/11/95
				WO	9530894 A	16/11/95
US	4393719	A	19/07/83	NONE		

## INTERNATIONAL SEARCH REPORT

Information on  family members

26/07/03

International application No.

PCT/03/00226

Patent document cited in search report			Publication date	Patent family member(s)		Publication date
US	5701009	A	23/12/97	AU	6146394 A	26/09/94
				EP	0687359 A	20/12/95
				GB	2291712 A	31/01/96
				GB	9304553 D	00/00/00
				GB	9517980 D	00/00/00
				JP	8507377 T	06/08/96
				WO	9420845 A	15/09/94
				GB	9308615 D	00/00/00
				GB	9310785 D	00/00/00
				AT	236906 T	15/04/03
				AU	681478 B	28/08/97
				AU	1324595 A	01/08/95
				CA	2179530 A	13/07/95
				DE	69530281 D	00/00/00
				EP	0739345 A,B	30/10/96
				FI	962810 A	10/07/96
				GB	9400411 D	00/00/00
				HU	74429 A	30/12/96
				HU	219238 B	28/03/01
				HU	9601892 D	00/00/00
				JP	9509407 T	22/09/97
				NO	309680 B	12/03/01
				NO	962899 A	10/07/96
				NZ	277859 A	27/07/97
				US	5698546 A	16/12/97
				WO	9518808 A	13/07/95
US	4193296	A	18/03/80	FI	63298 B,C	31/01/83
				FI	772326 A	02/02/79
				SE	433886 B,C	18/06/84
				SE	7807353 A	02/02/79
US	3688106	A	29/08/72	DE	2014747 A,B,C	01/10/70
				GB	1300555 A	20/12/72
				US	3842670 A	22/10/74